United States Department of Agriculture | Forest Service | Arizona Zone Entomology and Pathology | 2500 S. Pine Knoll Dr. Flagstaff, AZ 86001 FAX: (520) 556-2130 Voice: (520) 556-2073

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Route To: *

Subject: Dwarf Mistletoe and Bark Beetle Input for Iron Mine/Maxwell 20K (IMAX) Effects Analysis

To: Bruce Koyiyumptewa, Team Leader

As requested, this letter compares the effects of implementing the two alternatives developed for the IMAX analysis on dwarf mistletoe infection and on bark beetle susceptibility and risk. The IMAX analysis area encompasses 22,601 acres, located along the Mogollon Rim. Vegetation consists predominantly of ponderosa pine/Arizona fescue cover type with Gamble oak, alligator juniper and New Mexico locust intermixed. Ponderosa pine stand densities vary from 40 square feet of basal area per acre (BA) to 170 BA often occurring in clumps. Fifty-one percent of the IMAX acres were inventoried.

Dwarf mistletoes (DM) are the most prevalent disease causing agents in Southwestern forests. Growth reduction is their most important effect, although severe infection greatly reduces tree life expectancy. Twenty-six percent of the IMAX surveyed sites were infected with southwestern dwarf mistletoe. Most of these were lightly to moderately infected, with only a few showing high levels of infection. In some previous analyses on the Long Valley Ranger District, anywhere from 60 to over 80 percent of the sites had some level of DM infection.

The two most common bark beetles affecting ponderosa pine along the Mogollon Rim in Arizona are the pine engraver beetles, *Ips* species, and the western pine beetle, *Dendroctonus brevicomis*. The pine engravers have been the predominant beetle causing tree mortality in the Long Valley, Blue Ridge area in the last 10 years. Pine engraver beetles prefer to breed in fresh pine debris such as that created during logging or construction operations or by weather events such as heavy snow, ice or wind storms; however living trees can be attacked, sometimes in great numbers in certain situations. A number of factors are associated with outbreaks of pine engraver beetles in living trees, including drought, presence of pathogens such as dwarf mistletoe, wildfires, dense stand conditions, etc. Pine engraver beetles typically attack smaller diameter trees or tops of larger trees. Western pine beetle outbreaks are favored by many of the same factors, except that this insect does not breed in pine debris and it prefers larger diameter trees. In general, for both insects stand densities greater 120 square feet are thought to be most susceptible.

In the IMAX 20K, approximately 10 percent of the sites have densities greater than 120 BA. Based on aerial detection surveys, bark beetle infestations have typically been infrequent and localized (10-20 trees).

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Effects of Alternatives:

Alternative A. Alternative A is a no action alternative. Under this alternative there would be little change in vegetative condition from the existing. **Dwarf mistletoe will continue to spread and intensify, affecting growth and longevity. The average rate of spread is 1 foot per year. DM infection may be reduced in areas affected by wildfire.**

Susceptibility to western pine beetle will slowly increase over time. Areas with the greatest likelihood of infestation are those with densities greater then 120 BA and average diameters greater than 12 inches. Susceptibility to Ips would continue to increase with activity most likely occurring in response the event of a drought or a snow or ice event that creates fresh pine debris.

Alternative B. This alternative proposes to thin ponderosa pine understory on 2,805 acres by selecting trees in the 1" to 9" diameter at breast height (DBH) size classes and utilizing irregular spacing. The understory thinning slash will be broadcast burned if the slash fuel loading exceeds 10 tons per acre. In addition, 7,000 acres of the Aztec Prescribed Burning Projects located within the IMAX 20K will be prescribed burned to maintain fuel loading at 6 to 10 tons per acre. To achieve this, maintenance burning will be conducted every 7 to 10 years by burning approximately 1,500 to 2,000 acres per year.

The proposed thinning and prescribed burning should reduce the level of dwarf mistletoe infection and rate of spread. Dwarf mistletoe spreads by explosively released seeds which are expelled to distances typically ranging from 10 to 40 feet. Spread is most efficient and rapid from an infected overstory to an understory. In infected areas, the proposed treatment would reduce infection by removing the more heavily infected understory trees while increasing the distance among residual trees. Prescribed burning is expected to reduce the amount of DM infection in individual trees and cause some mortality. Dwarf mistletoe infected trees have been found to suffer more crown scorch than healthy trees because they have flammable witches' brooms and lower crowns. Moreover, given equal amounts of crown scorch (within the 38% to 87% range) heavily infected trees have less than half the probability of survival than uninfected trees.

Under this alternative susceptibility to western pine beetle would be reduced in those areas where densities are reduced to less than 120 BA, preferably well below 120 square feet in order to allow for growth prior to the next entry. In areas with ponderosa pine trees with average diameters 10 inches or greater this would mean going to a wider spacing than 15 feet. Fore example, for areas with an average diameter of 12 inches one would need to go to a spacing of 18 feet or greater in order to reduce densities to below 120 BA. While long term susceptibility to bark beetles would be reduced in those areas treated as described above, risk of an Ips outbreak in living trees would increase temporarily during treatment when fresh pine slash is available for colonization. Risk would be highest in years when precipitation is 75 percent or less of average. Chipping or removal of slash, if done promptly, would mitigate this risk. Lopping to one foot would also help, though it would be best to lop and scatter slash in openings. Other tactics to reduce risk of an outbreak in

standing trees include, crushing or burning slash promptly after creation. scheduling thinning between July and December (minimize creation between January and June), and monitoring green slash following creation so that if a serious infestation develops it can be treated.

If you have any questions or concerns about this letter please feel free to contact me at (520) 556-2075 or mfairwea/r3,coconino.

/s/ Mary Lou Fairweather

MARY LOU FAIRWEATHER
Forest Pathologist

cc:
LLucero/r3
FOR/r3
DParker/r3

E&P:M.Fairweather:mlf:5/21/99:(520)556-2074
Concur:B.Tkacz:5/21/99